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[REDACTED]

October 5, 1961

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[REDACTED]
Contracting Officer's Technical Representative
Task Order #2

Subject: Progress Report No. 16 [REDACTED]

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Dear [REDACTED]

In the meeting on September 18, 1961, you indicated that you would like the next progress report to include a review of Task Order #2. Enclosed is Progress Report No. 16 which covers the period from August 5, 1961 thru September 30, 1961, containing a review of the tasks since the beginning of Task Order #2, on January, 1960.

You may note that in addition to the computer programs we have delivered, we have also conducted a preliminary study for a new computer (Report [REDACTED]; and an evaluation of SS/I of the SAMOS satellite as it relates to your operation (Report [REDACTED]). Since these reports were initiated over a year ago, we would be glad to discuss any changes in your operations or requirements and the affect of these changes on our original recommendations. For example, if Information Retrieval were no longer a requirement the computer system configuration should be drastically changed.

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I have also enclosed a copy of the detailed questions concerning the computer programs that John and I discussed in a meeting on September 28, 1961.

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In these two meetings some topics were discussed which would result in a change of scope of Task Order #2. Some of the items can be performed within the present funds; however, some of the items would necessitate an increase in funds. A proposed amendment with a cost estimate for the following items will be submitted upon request:

1) Write, test, and deliver a computer program in Fortran for determining the orientation of photography by utilizing horizon exposures. The program would be tested on an IBM 7090 computer; testing time to be furnished by the customer.

2) Write, test, and deliver computer programs in ALWAC code for inputting coordinates, applying corrections, and storing them in memory for coordinates generated by each of the following measuring instruments:

- a. Stereo-comparator
- b. Large Area Record Reader
- c. Coordinatorgraph

3) Write, test, and deliver a set of ALWAC III-E computer test programs to test all commands and isolate machine failures.

The request to program the control extension in Fortran instead of ALWAC code will not require any additional funds for programming effort. If a computer can be furnished for testing the program no additional funds will be required for this task. If you can not arrange for a computer, we will try to obtain the lowest rental rate available in the Washington area.

Sincerely,

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Encl: (1) ☐ Report No. 16
(2) Notes of Meeting, September 28, 1961

(encl. 1)

COMPREHENSIVE PHOTOGRAMMETRIC COMPUTING SYSTEM

Progress Report No. 16

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A. Review

The following tasks have been completed and reports submitted:

Task No.

4. Rectification Program for Electronic

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Rectifier,

5. Least Square adjustment of Lines in Space and

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Their Intersection,

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7. Shadow Factor for Each Mission,

11. Solution of Spherical Triangles,

14. Investigation of New Computer Requirements,

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15. Evaluation of SS/I,

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16. Orientation from Horizon Images for Recomp II,

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17. Supplemental work on Orientation Determination from Horizon Images for ALWAC III-E, .

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18. Two-Photograph Space Intersection,

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The remaining tasks are described below, with their scheduled completion dates.

Task No.

1 and 6. The Height Determination tasks have been combined into a composite program. The program is written and is currently being tested. It can not be completed until a firm input format can be established. Scheduled completion date, December 1961.

2. The determination of Orientation Elements from the Horizon Program was originally flowcharted and partially programmed in February-March 1961. However, due to a change in priority the work was delayed until August, 1961. In our meeting of September 18, 1961, a request was made to write the program in ALWAC Code and Fortran. This program is nearing the testing stage, therefore, we will need sample points for testing. Scheduled completion date, January 1962.

STATINTL 3. The ☐ Rectifier Program has been written and tested. It should be delivered during October.

8, 9, and 10. These tasks have been combined into a general control extension program. In our meeting of September 18, a request was made to write the program in Fortran instead of ALWAC III-E code. Scheduled completion date, February 1962.

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12. The Camera Calibration program is written and is being tested. Scheduled completion date, November 1961.

13. After clarification of the purpose of Task 13, it was mutually decided that no further requirement for the transformation existed, since its use would be limited.

B. Current Progress

The computer program and report for the Elec-STATINTL tronic Rectifier were completed and delivered in August 1961.

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Testing on the Rectifier Program was completed and the report is being prepared. A draft of the report will be submitted to your personnel for approval.

Considerable effort has been expended in providing programming assistance to the ALWAC Field Engineers in the installation of the ALWAC III-E. The following services have been provided:

- (1) Writing test programs to test instructions excluded by the ALWAC test programs;
- (2) Preparing program tapes in various input formats for use by the Field Engineers;
- (3) Writing short programs which continuously use a certain sequence to cause intermittent troubles to show up more regularly; and,

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(4) Testing individual instructions to find out which ones are on the machine and which are not, so that the Field Engineers can request the necessary logic diagrams and parts.

We plan to have the computer operational in October. Work has been continuing on the Calibration, Coordinate Input and Correction, Orientation from Horizon, and Height Determination Programs as described in Section A, Review.

(encl.2)

Notes of Meeting With John, Sept. 28, 1961

STATINTL The following questions concerning the photogrammetric programs were raised by and answered by the client.

1.0 DATA TAPE PREPARATION AND FORMAT

1.1 Q. Are point numbers assigned by the analyst or comparator operator?

A. Point numbers refer to the object, regardless of the frame they appear on. For the control extension, point numbers are assigned by the analyst; for other problems, point numbers are assigned by the comparator operator.

1.2 Q. Is there any difference in point number or identification for pass points, control points, or points of interest?

STATINTL A. At present, there is no fixed identification scheme. should recommend one.

1.3 Q. Will a code indicate when a point does not appear on one photograph of an overlapping pair?

A. No. When a point appears on only one photograph of a pair it will not be input. Only point pairs or triplets (control extension) will be input.

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1.4 Q. Will the coordinate input program be required to accept data prepared by different measuring instruments?

A. Yes. There are four measuring instruments that may be used: stereo comparator, comparator, large area record reader, and the coordinatorgraph. The automatic curve follower will not be used for any of these programs. The computation programs should be programmed to operate on coordinates pre-stored in memory by an input program. Additional input programs may have to be written to accommodate the varied output formats of each measuring device. The identification field may have to be expanded to express the complete photograph number and point number.

Input formats for the calibration program and the horizon program will be programmed per the sample formats submitted.

1.5 Q. Will approximate exterior coordinates be input for all points in the Control Extension Program?

A. No. The program must be capable of accepting any number of exterior coordinates and properly matching them with the corresponding interior coordinates.

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1.6 Q. Are headings desired for input data?

A. No.

1.7 Q. What are the expected values of shrinkage correction with respect to the film bases utilized?

A. (The answer is to be furnished at a later date).

1.8 Q. Will you supply us with sample image coordinates to check the calibration and horizon programs?

A. Yes.

2.0 CAMERA CALIBRATION

STATINTL 2.1 Q. What input format is desired on information obtained from Catalog?

A. The information is already punched on cards. Try to adapt an input format that will utilize the information as punched on the cards.

2.2 Q. Is it necessary to require the local ground temperature and air pressure at the time of exposure as an input?

A. Consideration should be given to overall accuracy of the atmospheric refraction equation and the affect of temperature of the various layers. An article on this subject appeared in the Journal of the American Rocket Society last year.

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3.0 HORIZON

3.1 Q. Can a range or value be set for the flying height? Is it constant throughout the fan?

A. Yes. Classified. Program should provide for input of flying height and cloud cover for each fan.

3.2 Q. How will the case of a frame not containing the horizon be indicated?

A. It will not be input.

3.3 Q. Which output information is desired on the flexowriter and which on ☐ tape?

A. Running communications between the computer and operator are to be output on the flex. The input comments section and final solution are output on tape.

3.4 Q. What is the maximum number of fans over which interpolation will be valid? Should a least squares adjustment along the centers be performed?

A. The maximum sequence for interpolation is 73737. Linear interpolation along centers is adequate.

3.5 Q. Is the focal length constant throughout the fan?

A. Yes.

3.6 Q. Can points in the right and left overlap areas be batched and identified as such?

A. Yes, all the points in one overlap area can be read together.

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3.7 Q. Will initial approximations for ω and k be known for each fan? How accurate will these approximations be?

A. Program should provide option for input of ω , k . The approximations would be within 5° .

3.8 Q. What is the rate of frames/sec?

A. The rate is sufficiently fast, that k does not change rapidly between fans.

3.9 Q. Should the program provide for the horizon appearing on the 3 frame fan? Or on any frame other than No. 1 or 7?

A. No. No.

3.10 Q. Will it be acceptable for the program to ignore a 7 frame fan if it does not contain horizon images when it is the initial or final frame of a run?

A. Yes. No extrapolation is to be performed.

3.11 Q. What are the values of $\Delta\phi$, Δk for each frame?

A. Classified.

4.0 GENERAL

4.1 Q. Is there any requirement on the memory allocation of programs to provide simultaneous storage of programs on drum?

A. No.